Capital-Protected Structured Bonds

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The investors' market for structured investment products has traversed an impressive evolution during the last fifteen years. The diversity of the offerings reached previously unimaginable dimensions: Structured products are being composed by traditional investment products like fixed income bonds and derivative instruments. They enable investors to change and optimize their risk-return profile by asymmetric pay-off profiles. In other words the investment universe significantly enlarges by the appearance of these new types of investment opportunities. The economic benefit of such products has different aspects: As derivatives allow a very efficient risk transfer, they also ease the investors' risk and asset allocation. On the other hand they promote access to underlyings, that otherwise would not be possible to obtain. Especially advanced structured products are often based on underlyings – like commodities – that usually cannot be easily bought by private investors. Thereby structured products fulfill a market completion and generate additional diversification potential. As market standard these products are issued as capital guaranteed bonds, thereby minimizing the downside risks for the investors. This article will present the most common pay-off profiles of capital-protected structured bonds and their functioning mechanisms.

Key words: *capital-protected structured products, asymmetric pay-off profiles, investment universe enlargement*
JEL classification: *G15, G24*

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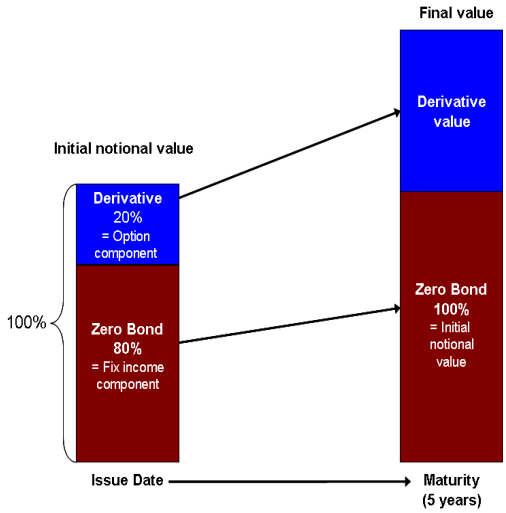
Capital-protected structured bonds offer investors exposure to chosen underlyings in various approaches and by a large variety of asymmetric pay-off profiles. But contrary to non-protected bonds the invested capital is not at risk and cannot be lost if the bond is held to maturity due to a capital guarantee given by the issuer. Therefore capital-protected structured bonds are defensive and conservative instruments, characterized by a lower risk profile (if the bond's issuer doesn't default) than other structured products and a different construction of the combined instruments to financially engineer capital protected structured bonds.

The general functioning of a capital guaranteed structured bond is as follows: The bond's notional amount is split into a zero bond, that will deliver the capital guarantee at maturity, and the difference between the zero bonds' value (=present value of the guarantee level at maturity) and the notional amount is used for structuring the performance component with options which deliver the agreed pay-off profile of the structured bond. The options give exposure to the selected underlying and allow the implementation of a strategy that reflects the investors' expected market development.

For example a structured bond notional of 100 EUR can be split into a 5-year-to-maturity zero bond which costs 80 EUR and therefore 20 EUR are left for option structuring purposes. The available investment amount into options of course depends on the relevant zero bond price and the interest level to maturity of the structured bond. The longer the maturity of the bond or the higher the interest rates (the cheaper the implemented zero bond), the more capital is available for the options (=performance component) and for the structuring process. Due to the necessity of the zero bond the maturity of capital-protected bonds is mid- to long-term from 3 years even up to 20 years.

Fig. 1: Components and Functioning of a capital guaranteed structured bond



Some of the most common capital-guaranteed pay-off profiles traded in the EU are:

Bull Bond

The first structures of this type emerged in the mid-1970s and used a zero bond and a "plain vanilla" long call option with an at-the-money strike price on an index. This simple structure however offered investors their initial capital plus a percentage of any gain by the underlying (equity) index. This first structured bond therefore enabled investors to participate with a rate equal to P in the equity markets without taking the risk of losing their initial capital. For example, an initial investment of 100 would be redeemed after a given number of years at 100% + 80% of any increase in the DJ EuroStoxx 50 Index.

The relevant redemption pay-off formula R at maturity T is:

$$R = 100\% + P * Max(0; \frac{Index_T}{Index_0} - 1) \quad (2.5)$$

The risk of losses is thereby completely limited while this structure offers the possibility of participating in any positive equity markets performance: If the market performance to maturity of the Bull Bond is positive the investor generates profits, if it is negative the investor won't suffer any losses. This asymmetric pay-off profile was very demanded by retail and institutional investors as it cuts their losses and lets their earnings run proportionally. So investors give up 100% participation in an upside market but in exchange cut away their risk of generating losses.

Fig. 2: Bull Bond pay-off with 80% participation rate at maturity (issue price 100%)

As the Bull Bond is constructed by an at-the-money long call and a zero bond with the same maturity, certain features have to be kept in mind when engaging into such an investment: For the final pay-off of the Bull Bond only the underlying performance at maturity is relevant (=path-independent option). By this fact the investor doesn't participate in any occurring positive performance of the underlying during its lifetime but only at maturity. For example if the maturity of the bond is 6 years and in year 4 the underlying performance is +70%, it will be of no help for the investor if the underlying performance at maturity is 0%. He would then only receive his invested capital (out of the zero bond) as the call option in this particular case has no value at maturity. This example also shows how important it is to have a clear view regarding the underlying performance to maturity when investing into any Bull Bond. As the investor doesn't hold the underlying directly – but a zero bond and a long call option on it – the price behavior of the Bull Bond during its lifetime has a delta below 1 and depends on the parameters that influence the price of the zero bond and the price of the call option (the underlying performance is therefore only one out of more relevant parameters). There is only one scenario in which the performance of the Bull Bond and the one of the relevant underlying are equal: If at maturity the underlying performance is positive, a Bull Bond with 100% participation rate will have the same value and performance. Otherwise there are arbitrage possibilities. Another important detail of Bull Bonds is its participation rate: The participation rate depends on the maturity of the bond, on the actual interest rate level, on the volatility of the underlying and its dividend yield. For example the longer the maturity, the cheaper the zero bond and therefore the more capital is available for buying long call options on the underlying (the more options can be bought the higher the participation rate). Or the higher the volatility (or lower dividend yield) of the underlying the higher the option price as its expected pay-off increases, and the lower the participation rate of the Bull Bond. Dividends again are included in the option price, but not in the underlying.

This basic structure was further developed to offer arrange of so-called "exotic" structures, as listed below.

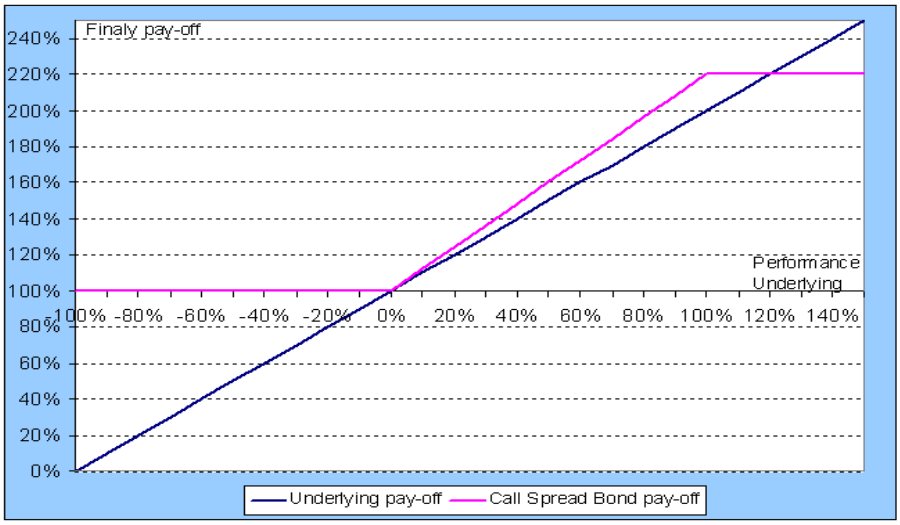
Call Spread Bond

In the 1990s Call Spread Bonds delivered a solution for increasing the participation rate in the underlying equity index by capping the upside performance potential at maturity. The components and functioning are similar to the Bull Bond with following exception: By additionally selling an out-of-the-money call option (short call), a premium is being generated through the implemented cap, that can be used to buy more at-the-money long call options and therefore to enhance the participation rate. For instance the investor would receive at maturity 100% + 120% of any increase in the DJ EuroStoxx 50 up to a limit of a doubling of the index. The trade-off is that the investor limits his upside potential until the cap is reached but therefore receives a higher participation rate. So Call Spread Bond investors have a positive market view, but don't expect the market to increase about a certain level (=cap) to maturity. Therefore they exchange the cap for a higher participation rate until the cap-level.

The relevant redemption pay-off formula R at maturity T is (whereby P will always be at least as high as for Bull Bonds for identical Parameters):

$$R = 100\,\% + P * Min\,(Cap\,; Max\,(0; \frac{Index_{\,T}}{Index_{\,0}} - 1)) \tag{2.6}$$

Fig. 3: Call Spread Bond pay-off with 120% participation and 220% cap at maturity (issue price 100%)



If at maturity the underlying performance is negative and below its issue price both call options are out-of-the money and worthless, but still the zero bond will have the value of 100% and repays the initially invested notional to the investor. If the underlying's performance at maturity is positive but below the cap, the long call option will be in-the-money and generate the underlying's performance times the participation rate, in addition to the initially invested capital (through the zero bond). The short call is worthless as it ends out-of-the money. If the underlying at maturity is even above the cap the investor receives 100% (from the zero bond) plus the performance of the underlying times the participation rate (from the long call), minus the cap-exceeding performance (the short call also is in-the-money and will be exercised by the counterpart). As shown in figure 15 only in this case the investor will be in a better position by a direct investment into the underlying – in any other cases the investor generates a better return profile through the Call Spread Bond than through a direct investment

(if held to maturity). Once again only the underlying performance at maturity is relevant for the final pay-off of the Call Spread Bond, and not the performance during its lifetime (=path-independent option).

The pricing parameters depend partially on the performance of the underlying but especially on its volatility, cap level, participation rate, maturity and dividend yield. That's because the price of the Call Spread Bond is determined by the actual price of the 2 embedded call options and the price of the zero bond. For example: The lower the cap, the higher the generated premium out of the short call (as its pay-off expectancy and price increases). The additional premium can be used to buy additional at-the-money long calls which increase the participation rate of the Call Spread Bond. Therefore the lower the potential maximum return is, the higher the participation rate in the underlying's performance until that limit-level (cap) is reached.

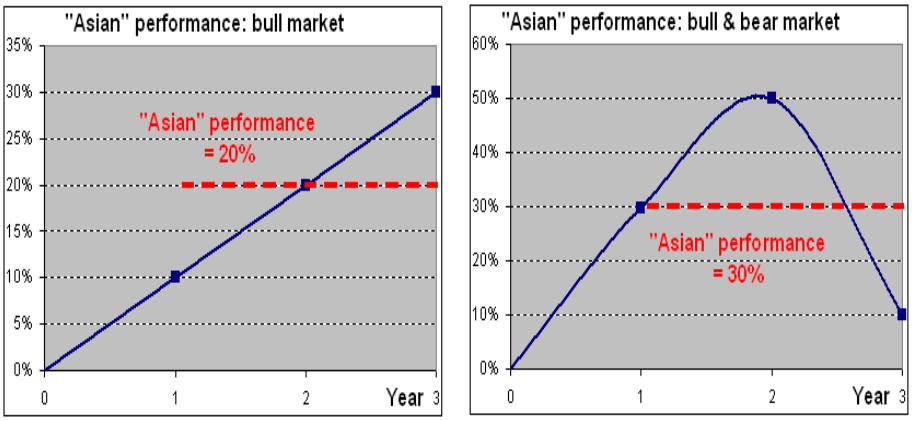
By slightly modifying the Bull Bond it was shown how a different risk/return profile can be generated, which allows investors to cover their subjective market view by fine-tuned structured bonds. They can have access to pay-off profiles that exactly incorporate their market expectations and still benefit from a 100% capital guarantee, what again wouldn't be possible by directly investing into the underlying.

Asian Bond

By investing in so called Asian Bonds the investor receives for example 100% + 100% of any increase in the underlying at maturity, but the performance of a long Asian call is calculated using the underlyings' *average* value over predefined observation dates during the investment lifetime (=path-dependent option). In cases where capital guaranteed products include an Asian option, the amount paid out at maturity depends on the average value of the underlying asset during its lifetime. The average is calculated using values or prices of the underlying asset taken at regular intervals. The frequency with which the value of the underlying asset is sampled varies widely from product to

product. The averages are usually calculated using monthly, quarterly, semi-annual, or annual values. Therefore when investing in Asian Bonds the performance of the underlying during its lifetime has a major impact on the redemption price at maturity, in contrast to Bull and Call Spread Bonds.

Fig. 4: "Asian Bond pay-off examples"



By using this "Asian" performance methodology, the volatility of the underlying is heavily reduced and therefore the option price is quite low for such options. The Asianing-effect is of advantage especially in volatile and falling markets; in constantly growing markets the Asianing-effect has a negative impact for the investor.

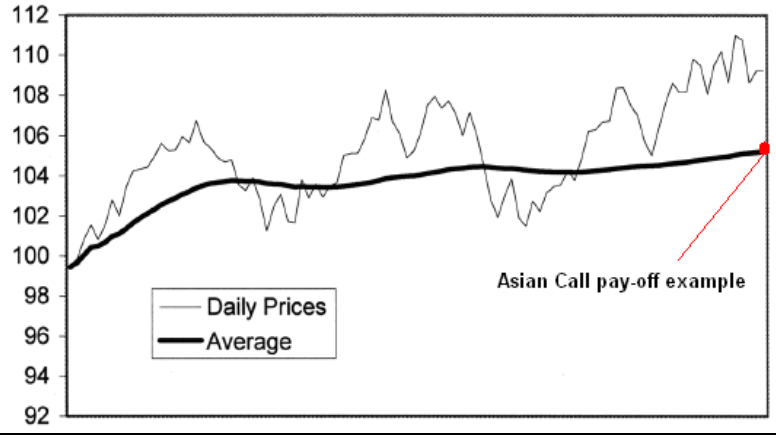
This time the relevant Asian call redemption pay-off formula R at maturity T is:

$$R = 100\,\% + P * Max\,(0; \frac{1}{n} * \sum_{t=1}^{n} \frac{Index_{\,t} - Index_{\,0}}{Index_{\,0}}) \quad (2.7)$$

n is defining the number of observation dates and t the relevant observation date.

The advantage of an Asian Bond in comparison to a Bull Bond is that it takes into account if the underlying performed positively during its lifetime, even if at maturity its performance might be 0%. The Bull Bond would in this case only repay the invested notional, but the Asian Bond repays the invested notional plus the influence of the performance during the lifetime of the product (example 1, figure 16). In this scenario the Bull Bond would be redeemed at 110% of the notional amount (assuming 100% participation rate for the "plain-vanilla" call), whereas the Asian Bond would be redeemed at 130% (assuming 100% participation rate for the Asian call) due to the underlying performance during its lifetime. In contrary to this scenario the Bull Bond would have the better performance than the Asian Bond if the underlying performs like in example 2 of figure 16. The Bull Bond would repay 130%, whereas the Asian Bond only repays 120% of the notional amount. The Asian Bond therefore refers to investors with a positive and volatile market view, and who don't want to depend only on the performance of the underlying at the maturity date, but also on the performance during its lifetime. In comparison to Bull Bonds and Call Spread Bonds especially the lower pay-off consequence of a strong negative drawdown of the underlying especially prior to maturity is strongly reduced by Asian Bonds.

Fig. 5: The effect of averaging ("Asianing-effect")



The price of an Asian call is always lower than a "plan vanilla" call, as the underlying's volatility is strongly reduced. The lesser observation points to maturity the higher the price of an Asian call and vice versa. The extreme case would be an Asian call with only one observation at maturity – this would be the only case where plain vanilla calls and Asian calls have the same price (as they generate the same pay-off at maturity). Although the Asian Bond is easily described, it is quite complex when it comes to pricing these options: As it is not possible to duplicate their pay-off with existing derivative instruments their pricing can only be done by numerical methods or Monte Carlo Simulations.[1] A further developed and also very often traded Asian Bond is the "Rainbow" or "Best of" Bond, which provide exposure to the average performance of a basket of 2 or more underlying indices. At maturity the best performing index gets the highest weight in the basket, the second best performing index gets the second highest weight etc. ("Rainbow") or only the best performing underlying is relevant for the final pay-off of the bond ("Best-of").

Lookback Bond

These kinds of structured bonds assure the investor a certain degree of participation in the highest ever observed underlying value during the lifetime of the bond (=path-dependent option). They refer especially to investors who expect a strong market performance during the product's lifetime, but who are not sure when to expect it and at which level the market changes its trend. One feature of certain options is that the overall performance of the underlying may be favorable for the investor but at maturity the underlying may move in an undesired direction. As mentioned earlier, one way of avoiding this risk is the use of Asian Bonds which dampen the effect. Lookback Bonds

[1] Analytic methods which use random numbers for uncertain variables and run a large number of simulations with them (usually more than 20,000).

also strongly reduce the negative effects of sharp market corrections prior to maturity.

For example an investor receives at maturity 100% + 90% of the highest index value of the DJ EuroStoxx50 Index (reached during the lifetime of the structured bond). By that mechanism the investor makes sure, that he will "freeze in" the highest index level and that he will not get out of the market too late or when the markets already are crashing. Due to that "highest level guarantee" feature, which ensures almost perfect market timing, these structured derivatives are quite expensive and usually allow a participation rate P of far below 100%. In special windows of opportunity it is though possible for an issue price of 100% to receive 100% capital guarantee and 100% highest level guarantee at maturity. These windows of opportunity open up when a maturity of at about 15 years is taken into account (lowers zero bond price) and a low implied market volatility (lowers the lookback option price).

The relevant lookback call redemption pay-off formula R at maturity T is:

$$R = 100\,\% + P * Max\,(0; \frac{Index_{\max}}{Index_{0}} - 1) \tag{2.8}$$

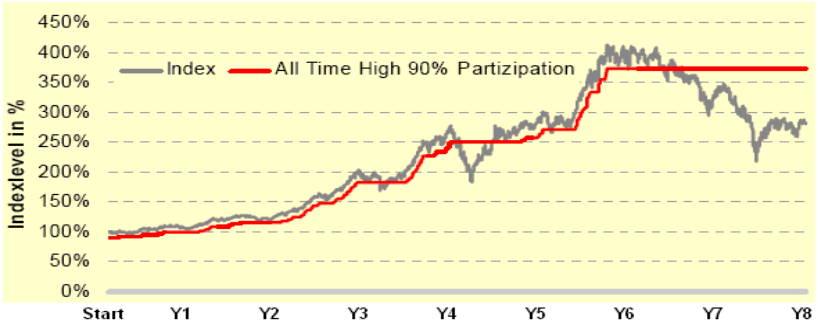
$Index_{\max}$ means the highest observed index level during the bond lifetime.

This profile of course also can be varied by making the relevant index observations not on a permanent, but perhaps on a monthly or quarterly basis. By this modification it would be possible to lower the option price (as there are not so many observation points for the highest level guarantee; the expected return decreases, as the possibility of freezing in the highest underlying level decreases) or for example to increase the participation rate. We could also implement the lookback feature on an Asian call, thereby dramatically lower the option price, as the volatility of the underlying also decreases as a result of the

"Asianing effect" (and thereby also the expected pay-off and the option price decreases). In general Lookback Bonds are very sensitive to the implied volatility of the underlying: The higher the volatility, the higher the chance for upside peaks of the underlying and therefore the higher the expected return of the Lookback Bond. Another modification is to activate highest level guarantees only when certain underlying values are reached (up-and-in long put; "knock-in" option)[1], what also lowers the price of the Lookback Bond. But the feature of knock-in options will be further described within the following chapter.

Lookback Bonds are also very demanded by investors, as they offer capital protection and at the same time enable investors to "freeze in" the highest ever reached levels of the underlying, no matter what happens to the underlying afterwards. For example if a Lookback Bond offers 90% participation in the underlying which reaches 70% performance (even before maturity), the investor already knows, that he will receive a redemption amount of at least 100% (out of the zero bond) plus 63% (=90%*70% out of the lookback option) at maturity. This value also cannot decrease anymore (but it still could increase), as it is guaranteed by the embedded structure.

Fig. 6: Lookback Bond pay-off profile



[1] „Knock-in" options: options that become activated only if the underlying reaches some predefined values: „Up-and-in" = The option becomes activated only if the underlying reaches a certain higher value than the current price of the underlying; „Down-and-in": The option becomes activated only if the underlying reaches a certain lower value than the current price of the underlying

But of course due to their obvious advantage they are much more expensive than the previously presented bonds or only available with low participation rates (which increase with longer maturities of the bonds). Still the main idea is to combine a capital guarantee with an attractive upside performance potential generated through the underlying and the structured pay-off.

Also in this case dividends are not included in the underlying values, but in the option price (the higher the dividend yield of the underlying the lower the price of the Lookback Bond).

Best Entry Bond

Best entry derivatives complete structured bonds that should not only protect investors against sharp market corrections during the lifetime of the product but also makes them generate profits out of such market drawdowns by reducing the strike levels of the underlying: They usually have a barrier below the initial value of the underlying index, which becomes activated as soon as the index hits that barrier (=down-and-in long call, "knock-in" option). Afterwards this barrier is the new strike level for the underlying index and relevant for the final pay-off (path-dependent option). In other words, if the underlying hits the barrier, the long call at the barrier level is activated. For example the structured bond pays off at maturity an amount of 100% + 100% of any increase in the index from the agreed barrier level, but only if the barrier level has been hit during the lifetime. If the underlying doesn't hit the barrier during its lifetime, the investor receives the invested capital plus the positive index performance. If the index performance is negative to maturity the investor receives his invested capital at maturity.

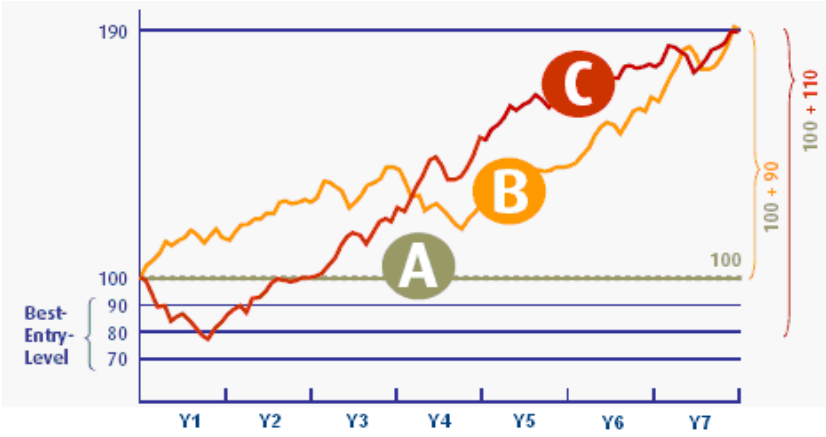
Therefore the structure is identically to a Bull Bond (zero bond and at-the-money long call) with a participation rate of 100% *plus* an in-the-money long call that becomes activated only when the underlying hits the predefined barrier level or in-the-money strike price of the call

(=down-and-in long call). By the fact that a further feature / option is implemented in comparison to the simple Bull Bond, the Best Entry Bond has to be more expensive as it offers higher pay-off possibilities (ceteris paribus). With a barrier level equal to the initial level of the index, this bond would be a simple call as it directly knocks in and the pay-off as well as the price of a Best Entry and a Bull Bond would be the same. Similar to the lookback the Best Entry Bond also is a very good timing tool for investors but this time ensuring that they will not get back into the market too late after a crash, or that they miss the lowest entry level. Lookbacks and Best Entry Bonds are of the same nature and structured with so-called "knock-in" options as certain underlying values have to be reached and thereby activate additional implemented options, which influence the final pay-off. But contrary to Lookback Bonds the Best Entry Bonds don't freeze in a put at the highest underlying level but a call at the lowest index level. Investors who expect strong bullish markets with the risk of strong drawdowns afterwards should buy a Lookback Bond, whereas investors who expect strong bearish markets with the potential of strong upside corrections afterwards should invest into a Best Entry Bond.

We can modify the parameters for example by introducing 3 knock in barriers at 90, 80 and 70% of the initial index value, which are only observed during the first two years of a 7-year-to-maturity Best Entry Bond. Of course as soon as a new lower barrier level is hit, the previously activated call option expires directly, and the new lower level call option becomes activated. A good example for that structure is given by the "Best Entry Fox" offered by the Austrian mutual fund company C-QUADRAT (underlying: DJ Stoxx Select Dividend 30 Index; ISIN: DE000A0G4LS9). By introducing 3 additional down-and-in calls in the first 2 years to the at-the-money strike call to maturity, the price is lower than of a Best Entry Bond with permanent observation of the lowest underlying value. That's because investors lower their chances for receiving the overall lowest index level as their new strike value: For example if the overall lowest index value is

reached in year 3 at 50%, a permanent observation Best Entry Bond would take this level into account as the new strike level of the underlying – whereby the "Best Entry Fox" would have a higher strike level (and therefore lower pay-off) due to the fact, that the knock-in call options are valid only during the first two years.

Fig. 7: "Best Entry Fox" possible pay-off profiles



By combining the 4 calls (long at-the-money call, long down-and-in call with strike 90%, long down-and-in call with strike 80%, long down-and-in call with strike 70%. The down-and-in calls expire directly when a new barrier level is reached) and a zero bond, the investors will always receive the maximum out of the redemption possibilities A (capital-guarantee), B (performance of the underlying to maturity), C (performance of the underlying to maturity striked at one of the activated best entry level) depending on the index level development during the lifetime of the bond and still enjoy a complete capital guarantee (figure 19). By this structured bond the investors will always receive at least the return of a direct investment into the underlying, or even more if held to maturity. But again it has to be mentioned that the bond will have a different price behavior compared to the underlying during its lifetime, as the Best Entry Bond price depends on the

price changes of the implemented options (although the underlying performance of course also has an impact on the option prices during their lifetime) and the zero bond.

The relevant redemption pay-off formula R of this structured bond at maturity T is:

$$R = 100\% + Max\left(0\%; P * (\frac{Index_T - Index_{bestentry}}{Index_0})\right) \quad (2.9)$$

The profile can also be interpreted as a lookback derivative, but only that this time we will not measure the highest but the lowest reached index level during a certain observation period and freeze in the relevant barrier level. As usual dividends are not included into the underlying, but in the price of the options.

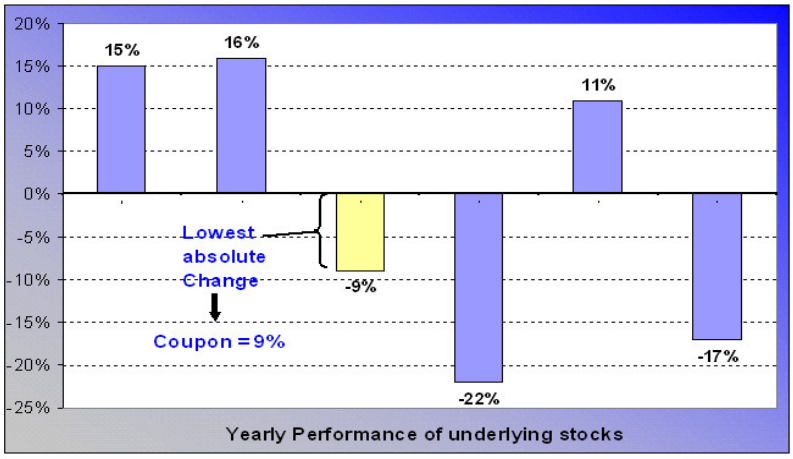
Correlation Bonds

In the last 6 – 8 years this new kind of structured products emerged. These capital guaranteed structures in general pay a yearly coupon and take into account the correlation between underlying instruments like 20 different stocks or indices which form the underlying basket. They therefore require new techniques using new concepts, as they are very sophisticated in pay out profiles and pricing requirements. Two kinds of very successful and actively traded Correlation Bonds will be presented in this chapter: The *Swing Bond* and the *Altiplano Bond*.

The capital guaranteed Swing Bond pays an annual coupon equal to the smallest annual *absolute* change of all 20 stocks in the underlying stock basket. Thereby investors have a market neutral pay-off, which can generate attractive coupons in falling as well as rising stock markets. If markets crash and all underlying stocks have a negative performance the investor still receives a positive coupon as only the absolute values of the stocks are relevant.

By Swing Bonds investors don't necessarily have to commit themselves to a positive or negative market view, but must have a positive view on a rising volatility and correlation regarding the implemented underlyings.

Fig. 8: Coupon example Swing Bond with 6 underlying stocks



These structured bonds enabled the issuers to sell correlation risks off their trading books to investors willing to take them. The higher the correlation of the underlying stocks, the higher the probability that all stocks behave similar, and the lower the probability that a stock change is smaller than the others. This of course makes the Swing Bond more expensive and vice versa. In risk positioning terms the investor is correlation long (as he profits from a rise in the correlation of the stocks) and the issuer has the correlation short position. In later stages these bonds have been further developed for example by the introduction of a lock-in feature for the paid coupon: That means the yearly coupon is the maximum out of the yearly smallest absolute change of the basket members and the previous coupon. By that feature the yearly coupon can only increase as the previously paid coupon is frozen as minimum coupon for the next observation period.

Another Correlation Bond is the capital guaranteed Altiplano Bond: It pays a yearly high coupon - for example 12% - as long as none of the underlying 20 stocks falls below 65% of its initial value at certain observation points in time. If one of the stocks hits the barrier, the coupon for that year will be cancelled. The Altiplano Bond refers to investors who have a generally positive view on the underlying stocks, but can't exclude that there may also be moderate losses in those stocks. As long as their expectation is correct and the losses don't exceed 35%, investors will generate an above-market level coupon on their invested notional. In later stages these bonds have been further developed for example by the introduction of a so-called "snowball" feature: That means if there is a year with no coupon payment the coupon isn't necessarily lost for all times, but could be repaid in one of the following coupon periods. If during one of the next coupon periods (at the relevant observation points) the market recovers and all stocks close above the relevant barrier all "lost" coupons will be repaid additionally to the coupon for that period. So it could be even possible, that a 5-years-to-maturity Altiplano "Snowball" Bond doesn't pay a coupon during the first 4 years (if the barrier is hit by one or more stocks in all 4 years), but in the last year repays all 4 missed coupons plus the last coupon cumulated (if in the last period the market recovered and all stocks closed above their relevant barrier). Again a higher correlation increases the probability that all stock behave similar and lowers the probability that a stock loses more value than the others. Thereby it increases the probability of receiving the high coupon for the investor and the price of the Altiplano Bond. And again the investment bank takes the correlation short and the investor the correlation long position.

Correlation Bonds already are so complex in terms of pricing, that it isn't possible to duplicate their pay-off with market traded plain-vanilla options. Their price is therefore generated by highly sophisticated Monte Carlo Simulations and very advanced mathematic pricing engines. Of course the parameters for that kind of structured Correlation

Bonds may vary in terms of barrier level, number of stocks, high coupon amount, whether a fix minimum coupon is paid or not, number of barrier observation dates, dividends, volatility etc. (with a non-linear effect to the price of the bond). Each change in one of the mentioned parameter might already have a major impact on the price of the Correlation Bond as it may dramatically shift the expected return at maturity into the investor's (higher issue price) or the issuer's favor (lower issue price).

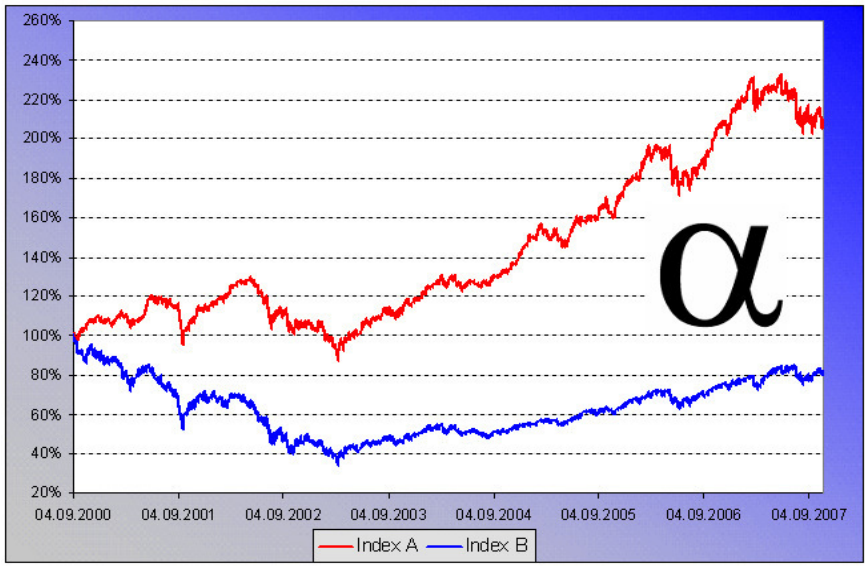
One weakness of the Correlation Bonds in general is that they are "worst-of" options: That means one stock out of twenty is enough to minimize investors' returns – for example if 19 stocks of an Altiplano Bond are far above their barrier level it is enough if one stock has a very negative performance and closes below the barrier so that the coupon will be cancelled. Therefore investors take quite a high single stock risk when investing in such kind of structures, but of course the higher risk gets also paid by potential higher coupons far above the general market level.

Alpha Bonds

Alpha Bonds are another capital guaranteed market neutral investment covering special requirements of investors. Similar to Swing and Altiplano Bonds the Alpha Bonds refer to investors who are unsure about the markets' future development and want to have the possibility of generating returns in falling, neutral or rising markets. Alpha measures the difference (=outperformance) between two underlyings which usually are 2 equity indices. If investors have a positive view regarding the outperformance of one sector or region versus the general market - maybe that biotechnology, financials or Asia should perform better than the market represented by the MSCI World Index - no matter in which direction the broad market moves, Alpha Bonds can transform their view into positive returns.

For example following Alpha Bond pay-off can be traded as issued in February 2007 by Barclays Bank PLC (ISIN DE000BC0EJU5): The two relevant underlying indices are the DJ Stoxx Select Dividend 30 Index and the DJ EuroStoxx50 Index. At maturity after 2.5 years the investor receives 100% + 100% of the outperformance of the DJ Stoxx Select Dividend 30 Index (30 stocks with highest dividend yield in Europe) over the DJ EuroStoxx50 Index (50 stocks with largest market capitalization in Europe). In this case it is irrelevant if and how the indices performed positively or negatively since issue date. Only the relative difference between them at maturity is relevant (=path-independent option). Obviously this Alpha Bond is interesting especially for investors who expect high dividend yield stocks to outperform the general European stock market, no matter if the market will develop positively or negatively during the product's lifetime.

Fig. 9: "Alpha" example of Index A over Index B



If the Dividend Index performs 40% and the broad market performs only with 10% during the bond's lifetime, investors would receive a final pay-off of 100% capital guarantee from the zero bond plus 30% from the outperformance (=alpha). If the Dividend Index performs negatively with -20% and the European market (DJ EuroStoxx50 Index) performs even worse with -55% during the bond's lifetime, investors would still receive a positive final pay-off of 100% capital guarantee plus 35% from the outperformance. This example shows how positive returns can be generated by Alpha Bonds even in a very negative market environment. Only if at maturity the performance of the DJ EuroStoxx50 Index is above the one of the Dividend Index, the investors receive no more than their initially invested notional.

As the name of this structure already indicates there is no more systematic (beta) market risk, but only an unsystematic risk (alpha) remains in the investors' portfolios.

One improvement of the Alpha Bonds is that contrary to Correlation Bonds investors don't have any single stock risks in their portfolio, but can implement their very own market view regarding certain sectors, regions and countries. Further developed Alpha Bonds may at maturity also offer the possibility to receive the highest ever observed outperformance between the two relevant underlyings during the lifetime of the bond (=path-dependent option). This feature is similar to the Lookback Bonds and also a knock-in option (up-and-in long put): It improves the Alpha Bond as the investor doesn't only depend on the outperformance at the maturity date, but also profits from outperformance peaks that took place prior to maturity. As the expected final pay-off increases by the additional introduction of this lookback feature, the price of the modified Alpha Bond of course also becomes more expensive. The Alpha Bond is also an option based structure which offers the investor exposure to the outperformance of one underlying over another (=Alpha-Index). In general higher dividend yields, lower volatility and higher correlation of the Index expected to

outperform are parameters that lower the price of Alpha Bonds as they decrease its expected return at maturity and vice versa.

Conclusions

The general and traditional bond market is one of the most liquid financial markets worldwide with volumes / notional amounts by far exceeding the ones of the stock market. But because of their limited scope of design investors were very restrained to fix-coupon bonds or floaters. By structured products the investors now can join all advantages of a traditional bond – like for example capital protection – but additionally form their market expectations into a suited pay-off profile and thereby also participate in the performance of the chosen underlying with potentially higher returns than traditional bonds. Structured bonds with capital protection established themselves as an own asset class by fast growing outstanding notional amounts, high flexibility and tailor made redemption profiles. The huge field of structuring possibilities and portfolio optimizing potential generates a large number of possible additional market exposures in comparison to traditional financial products. The arrival of these complex derivatives opened up a whole new world for investors. Apart from the linear pay-off profiles offered by stocks, funds or indices investors nowadays have access to much more complex pay-off profiles in form of structured bonds. The possibilities of structured bonds are almost unlimited as their pay-off profiles can be exactly adapted to the investors' needs by setting the pricing parameters to reasonable values. The decision how to mix them and their exact form depends on investors' views and preferences as well as the pricing environment (interest rates, volatilities, dividends, maturity etc.).

Another important point that should be kept in mind is the complexity and multi-variable sensitivity of structured bonds when it comes to pricing them. Actually their pricing and evaluation is done by advanced computerized quantitative models and the support of high end

software programs. Although the pricing of the fixed income component is done by basic mathematics, it comes to much higher requirements for the pricing of the option component. The valuation of the option component is done by Monte Carlo Simulations in combination with an assumed underlying behaviour according to Black-Scholes, Heston or GARCH model.

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